Center Innovation Fund: GSFC CIF

Particle filter Simulation and Analysis Enabling Non-Traditional Navigation

Completed Technology Project (2011 - 2012)

Project Introduction

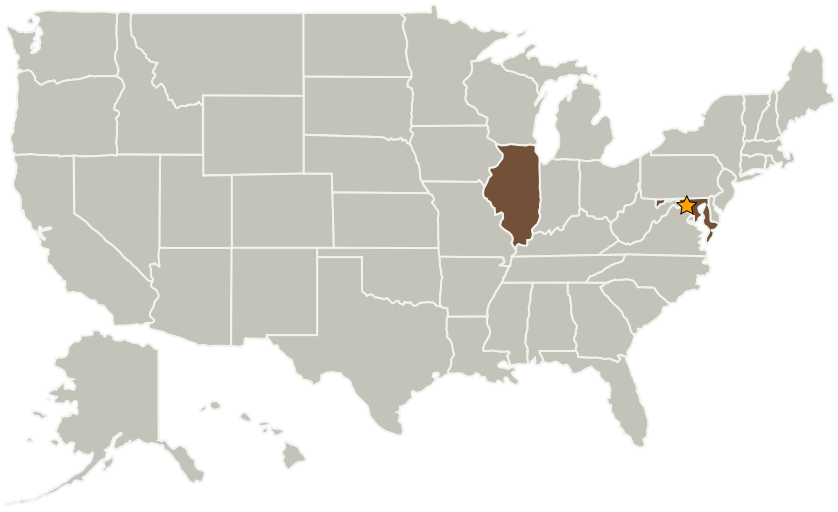
Particle Filters (PF) maintain a large cloud of separate estimates, or particles. PF's are potentially better able to handle significantly non-Gaussian errors, such as occur in conjunction prediction and orbit determination with event-driven disturbances. From among the wide range of possible PFs, we are investigating the approach best suited to NASA's non-traditional navigation challenges.

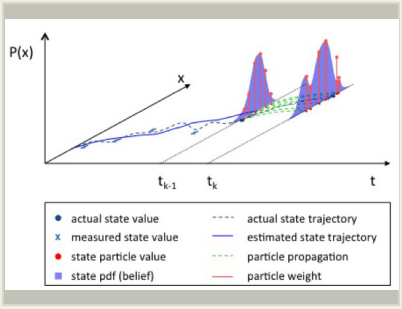
Incorporate PF into GSFC's Orbit Determination Toolbox (ODTBX). Augment PF with ODTBX' unique ability to partition error sources into subspaces for analysis. Utilize multi-core server to facilitate fast simulation of large particle populations.

Anticipated Benefits

Improved navigation performance and robustness for spacecraft perturbed by venting, momentum dumping, and other undetected small forces such as will occur with JWST and the Multi-Purpose Crew Exploration Vehicle.

Primary U.S. Work Locations and Key Partners





Project Image ROE FY12 CIF 348 CN Particle filter Simulation and Analysis Enabling Non-Traditional Navigation

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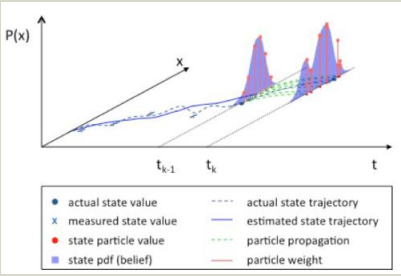
Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Purdue University-Main Campus	Supporting Organization	Academia	West Lafayette, Indiana

Primary U.S. Work Locations	
Illinois	Maryland

Images



53.jpg
Project Image ROE FY12 CIF 348 CN Particle filter Simulation and Analysis Enabling Non-Traditional Navigation
(https://techport.nasa.gov/image/1124)

Project Website:

http://aetd.gsfc.nasa.gov/

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Center / Facility:
Goddard Space Flight Center (GSFC)

Responsible Program:
Center Innovation Fund: GSFC CIF

Project Management

Program Director:
Michael R Lapointe

Program Manager:
Peter M Hughes

Project Manager:
John C Adams

Principal Investigator:
Russell Carpenter

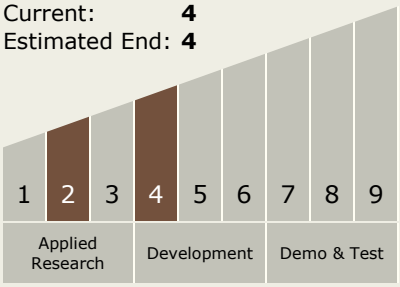
Co-Investigator:
John A Gaebler

Particle filter Simulation and Analysis Enabling Non-Traditional Navigation

Completed Technology Project (2011 - 2012)

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.2 Navigation Technologies
    - TX17.2.1 Onboard Navigation Algorithms